What is claimed is:

1. A medical device for measuring the concentration and/or percentages of one or more hemoglobin derivatives in a blood sample taken from a patient comprising;

a) a housing;

b) a holder for the blood sample contained within the housing;

c) a light generating apparatus contained within the housing comprising at least one compact light source emitting light in the visible region of the spectrum or at least one polychromatic light source and at least one light filter for separating the light from the polychromatic light source into distinct bandwidths along the visible spectrum; wherein the number of light sources or filters in the visible region of the electromagnetic spectrum is less than or equal to the number of hemoglobin derivatives to be measured;

d) a light receiving apparatus contained within the housing comprising at least one light detector receiving light for determining one or more absorbance values of the blood sample at one or more wavelengths within the bandwidth of each light source or filter in the visible region of the spectrum; and

e) a microprocessor for determining the concentration of each hemoglobin derivative from the measured absorbance values.

2. The medical device of claim 1 wherein the compact light source(s) or light filter(s) have bandwidths of about 7-50 nanometers.

3. The medical device of claim 1, wherein the optimal wavelength for determining the absorbance value(s) for a hemoglobin derivative depends on the characteristics of the compact light source and/or optical filter used in the device.

4. The medical device of claim 1, wherein the overall size of the device is sufficiently small so as to be hand-held.

5. The medical device of claim 1, wherein the portable device weighs less than about 50 pounds.

6. The medical device of claim 1, wherein at least one light source emits light ranging from about 450 nanometers to about 700 nanometers.

7. The medical device of claim 1, wherein the compact light sources comprise light emitting diodes, light emitting lasers, a polychromatic light or combinations thereof.

8. The medical device of claim 1, wherein the light receiving source(s) comprise photo detectors, photo diodes, pin diodes, photo transistors, CCD arrays, photo multiplier tubes or combinations thereof.

9. The medical device of claim 1, wherein the blood sample comprises hemolyzed blood.

10. The medical device of claim 1, further comprising at least one light source emitting light in the high visible to infra red region of the electromagnetic spectrum.

11. The medical device of claim 10, wherein the blood sample comprises non-hemolyzed blood.

12. The medical device of claim 10, wherein the light source emits light in the range of about 650 nanometers to about 1000 nanometers.

13. The medical device of claim 10, wherein the light receiving detector lies on the same plane as the plane used to measure the reflectance of the blood sample.

14. The medical device of claim 10, wherein the absorbance and/or reflectance is used to measure and/or calculate the hematocrit and/or to measure all hemoglobin derivatives as total hemoglobin of non-hemolyzed blood sample.

15. The medical device of claim 1, comprising at least two compact light sources for distinguishing two or more hemoglobin derivatives.

16. The medical device of claim 1, comprising at least three compact light sources for distinguishing three or more hemoglobin derivatives.

17. The medical device of claim 1, comprising at least five compact light sources for distinguishing five or more hemoglobin derivatives.

18. The medical device of claim 1, comprising at least three compact light sources for distinguishing two or more hemoglobin derivatives, wherein one light source emits light in the high visible to infra red region of the electromagnetic spectrum.

19. The medical device of claim 1, wherein the hemoglobin derivatives to be measured are oxyhemoglobin, reduced hemoglobin, partial hemoglobin, carboxyhemoglobin, methemoglobin, fetal hemoglobin and/or sulfhemoglobin.

20. The medical device of claim 1, wherein the device further yields values for total hemoglobin, hematocrit, oxygen saturation, fractional oxygen saturation, oxygen content and/or oxygen capacity.

21. The medical device of claim 1, wherein the microprocessor comprises software capable of validating and/or adjusting the measured concentrations and/or percentages of hemoglobin derivatives by use of one or more ratiometric curves.

22. The medical device of claim 1, wherein the device is battery powered.

23. The medical device of claim 21, wherein the ratiometric calibration curves comprise known ratios of absorbance values taken from absorbance spectra comprising more than one hemoglobin derivative.

24. The medical device of claim 21, wherein the ratiometric curves comprise spectral data for combinations of two or more hemoglobin derivatives at various known concentrations.

25. A method for determining concentrations and/or percentages of hemoglobin derivatives from a blood sample of a patient comprising;

a) selecting the medical device or system of claim 1;

b) obtaining a blood sample from a patient; and

c) determining the concentration and/or percentage of at least one hemoglobin derivative.

26. The method of claim 25, further comprising determining a value for total hemoglobin, hematocrit, oxygen saturation, fractional oxygen saturation, oxygen content and/or oxygen capacity.

27. The method of claim 25, further comprising validating and/or adjusting the measured concentration and/or percentages of any hemoglobin derivative by use of one or more ratiometric calibration curves.

28. The method of claim 25, wherein the optimal wavelength or wavelengths for measuring the concentration and/or percentages of the various hemoglobin derivatives depends on the compact light source or light filter used in the medical device.

29. The medical device of claim 25, wherein the ratiometric curves comprise known ratios of absorbance values taken from absorbance spectra comprising more than one hemoglobin derivative.

30. The medical device of claim 25, wherein the ratiometric curves comprise spectral data for combinations of two or more hemoglobin derivatives at various known concentrations.

31. A method of determining the concentration and/or percentages of hemoglobin derivatives in a blood sample taken from a patient using compact light sources and/or a polychromatic light source with filters comprising:

a) selecting certain bandwidths of light sources or filters to be used to measure the visible absorption spectrum of the blood sample, wherein the peak wavelength for each light source or light filter selected overlaps with the peak areas and/or areas of peak overlap for the known spectra of the hemoglobin derivatives to be measured;

b) performing a calculation that normalizes the distribution of the absorption coefficients of each hemoglobin derivative across the wavelength, wherein the normalized data yields a calculated weighted absorption spectrum for each hemoglobin derivative;

c) locating at least one optimal wavelength, or near optimal wavelength, for each hemoglobin derivative to be measured from each calculated absorption spectrum;

d) detecting an actual absorbance measurement at or near the optimal, or near optimal, wavelength or wavelengths selected for each hemoglobin derivative determined in step (d); and

e) using the measured absorbance for each wavelength to determine the concentration and/or percentage of each hemoglobin derivative in the blood sample.

32. The method of claim 31, wherein the normalization is based on characteristics of the light source or light sources.

33. The method of claim 31, wherein the normalization is based on characteristics of the filter or filters.

34. The method of claim 31, wherein the absorbances at each optimal wavelength are used to calculate the total hemoglobin, hematocrit, oxygen saturation, fractional oxygen saturation, oxygen content and/or oxygen capacity.

35. The method of claim 31, wherein the compact light sources are a light emitting diodes, light emitting lasers, a polychromatic light source and filters, and/or combinations thereof.

36. The method of claim 31, wherein the light receiving sources are photo detectors, photo diodes, pin diodes, photo transistors, CCD arrays, photo multiplier tubes or combinations thereof.

37. The method of claim 31, wherein the blood sample comprises non-hemolyzed blood.

38. The method of claim 37, further comprising measuring and/or calculating the absorbance and/or reflectance of the blood sample in the high visible to near infra red region of the optical spectrum and correcting the determined concentration of each hemoglobin derivative using the measured absorbance or reflectance value of the blood sample in the high visible to near infra red region of the spectrum.

39. The method of claim 37, further comprising measuring or calculating the hematocrit using the absorbance and/or reflectance of the high visible to near infra red range of the optical spectrum.

40. The method of claim 31, further comprising validating and/or adjusting the measured concentration and/or percentages of any hemoglobin derivative by use of one or more ratiometric curves.

41. The medical device of claim 28, wherein the ratiometric curves comprise known ratios of absorbance values taken from absorbance spectra comprising more than one hemoglobin derivative.

42. The medical device of claim 28, wherein the ratiometric curves comprise spectral data for combinations of two or more hemoglobin derivatives at varying known concentrations.

43. The method of claim 28, wherein the number of light sources or light filters in the visible region of the electromagnetic spectrum is less than or equal to the number of hemoglobin derivatives to be measured.

44. A medical system for measuring the concentration and/or percentages of one or more hemoglobin derivatives in a blood sample taken from a patient comprising;

a) a housing;

b) a light generating subsystem contained within the housing comprising at least one compact monochromatic light source emitting light in the visible region of the spectrum or at least one polychromatic light source and at least one light filter for separating the light from the polychromatic light source into distinct bandwidths along the visible spectrum; wherein the number of light sources or filters in the visible region of the electromagnetic spectrum is less than or equal to the number of hemoglobin derivatives to be measured;

c) a light receiving subsystem contained within the housing comprising at least one light detector receiving light for determining one or more absorbance values of the blood sample at one or more wavelengths within the bandwidth of each light source or filter in the visible region of the spectrum;

d) an emitter subsystem contained within the housing providing a constant current source;

e) a detector subsystem contained within the housing comprising a PIN diode;

f) a sensor optics subsystem contained within the housing comprising a block configured to hold a holder for the blood sample so that the holder is in optical communication with the emitter subsystem, the light receiving subsystem and the detector subsystem; and

g) a microprocessor subsystem contained within or outside of the housing for determining the concentration of each hemoglobin derivative from the measured absorbance values.

45. The system of claim 44, further comprising an external interface contained within the housing or outside of the housing for linking the system to other medical systems and/or devices.

46. The system of claim 44, wherein the microprocessor subsystem further comprises a microcontroller.

47. The system of claim 44, further comprising a data acquisition subsystem contained within the housing or outside of the housing.

48. The medical device of claim 44, wherein the microprocessor comprises software capable of validating and/or adjusting the measured concentrations and/or percentages of hemoglobin derivatives by use of one or more ratiometric curves.

49. The medical device of claim 45, wherein the medical device is linked to a pulse oximeter.

50. A method of improving the accuracy of a determination of the concentration or percentage of a mixture of unknown hemoglobin derivatives comprising:

a) preparing a series of known mixtures comprising two or more hemoglobin derivatives such that each mixture in the series differs in the percentage of each hemoglobin derivative;

b) observing the optical behavior of the series of mixtures;

c) selecting from the optical behavior of the series of mixtures, a wavelength, or wavelengths, where the optical behavior of series of mixtures appears different and a wavelength, or wavelengths, where the optical behavior of the series of mixtures appears similar, wherein optically determined values can be determined for each mixture at these selected wavelengths;

d) taking a ratio of the optically determined values for each mixture at the wavelength, or wavelengths, where the optical behavior appears different and at the wavelength, or wavelengths, where the optical behavior appears similar, to yield the ratiometric behavior of the series of mixture; and

f) using the ratiometric behavior of the series of known mixtures to improve the accuracy of optically determined values of an unknown mixture of hemoglobin derivatives by a comparison to the ratiometric behavior of the series of known mixtures.

51. The method of claim 50, wherein the ratiometric behavior of the series known mixtures is linearly related.

52. The method of claim 50, wherein the ratiometric behavior of known mixtures is observed for one or more separate mixtures where COHb, rHb and/or O_2HB is, or are, the dominating hemoglobin derivative, or derivatives, in each series of known mixtures.